Distr.
LIMITED

UNIDO/IS.341/Rev.2/.Add.1
14 January 1987

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

ENGLISH

DIRECTORY OF SOLAR RESEARCH INSTITUTES IN DEVELOPING COUNTRIES *

Addendum 1986

Prepared by

INTIB - The Industrial and Technological Information Bank

* This document has been reproduced without formal editing

V.87 80316

C O N T E N T S

Country	Name of Institute	Page
ANGOLA	Instituto de Energia Renovaveis	1
BRAZIL	Centro de Tecnologia-CPGEM	2
EGYPT	Khalifa for Engineering, Consultation and Computers Application	3
MEXICO	Department de Energia, CINVESTAV-IPN	4
NEPAL	Research Centre for Science and Technology (RECAST)	5
NIGERIA	Semiconductor Laboratory, University of Ife	6
PAKISTAN	N.W.F.P. University of Engineering and Technology	7
PERU	Institute of Industrial Technological Research and of Technological Research and Technical Standards	8
SRI LANKA	Arthur C. Clarke Centre for Modern Technologies	9
SUDAN	National Energy Administration (NEA) Energy Research Council	10 11
TOGO, Republic of	Solar Energy Laboratory	12
TURKEY	FIRAT University	13
VENEZUELA	Universidad Nacional Experimental	14

SUBJECT INDEX

Area of research	Institutes
Collectors (flat plate and concentrating)	128
Desalination/distillation	116, 120, 122, 129
Drying (crop, fish, timber etc)	116, 117, 120, 122, 123, 127
Industrial process heat	124
Photovoltaic conversion	116, 123
Selective surfaces	128
Solar cooker	120, 122, 126, 127
Solar cooling and refrigeration	117, 125
Solar materials	119, 121
Solar pond	117, 127
Solar radiation measurement	116, 117, 127, 129
Solar thermal applications	119
Solar water heating	122, 123, 127
Storage (thermal and photochemical)	119
Solar data handling	128
Related areas	
Biomass/biogas	116, 123, 127
Wind energy	116, 123, 126, 127
mini-, small-hydro	116, 123, 126
Energy conservation	118, 125
Energy planning	125
Computer modelling and simulation of energy systems	118

ANGOLA

116. INSTITUTO DE ENERGIA RENOVÁVEIS, MINISTÉRIO DA ENERGIA E PETRÓLEOS

Rua Rainha Ginga
Luanda
R.P. Angola

Telephone: 70730/70751/70752 Telex: Cable:

Director: Mr. Felix Mathias Neto

Contact person: Mr. Felix M. Neto, Head of Institute

9 professional staff (5 PhD)
Government funded Annual budget 1986: US$ 300,000

Areas of research:

- Photovoltaic solar energy
- Low temperature applications of solar energy
- Wind energy
- Biomass
- Ethanol-sugar cane
- Small hydroelectric power plants
- Solar radiation measurement

Current projects:

- Photovoltaic conversion
- Solar drying
- Solar water heating
- Solar desalination
- Water pumping (photovoltaic)
- Biomass gasification and biogas

Commercialized projects:

- Solar collector
- Solar drying

Joint research programmes carried out with:

- Universidade Agostinho Neto, R.P. Angola
- A.F.M.E. - Agence Francaise Pour La Maitrise de l'Energie
- I.P.T. Instituto de Pesquisa Tecnologicas do Sao Paulo

Suggested areas of co-operation with other research institutes:

-

BRAZIL

117. CENTRO DE TECNOLOGIA - CPGEM (Postgraduate course in Mechanical Engineering)

Universidade Federal de Paraiba
58059 Joao Pessoa Pb.
Brazil

Telephone: (083) 224 7200/2186 Telex:(083)2187 Cable:

Director: Prof. Jader Nunes de Oliveira (Centre)
Prof. Severino R. De Araújo (CPGEM):

Contact person: Pio Caetano Lobo, Professor

4 professional staff (in solar energy) (PhD)

Government funded Annual budget 1986: US$ 30,000

Areas of research:

- Solar refrigeration and natural cooling
- Solar ponds and collectors
- Solar radiation instruments and measurement
- Solar drying

Current projects:

- Solar and natural cooling
- Solar ponds
- Silica gel/water system adsorption/desorption characteristics
- Electrical equivalence phranometer
- Design procedures for drying of agricultural produce

Commercialized projects:

-
-
-

Joint research programmes carried out with:

-
-
-
-

Suggested areas of co-operation with other research institutes:

- Solar ponds
- Design and performance prediction of dryers
- Solar refrigeration and air conditioning

EGYPT

118. KHALIFA FOR ENGINEERING, CONSULTATION AND COMPUTERS APPLICATION

King Faisal City
King Faisal Road, Buildg. 7, Apt.2, 3rd floor
Giza
Egypt

Telephone: Telex: Cable:

Head of Institute: Dr. Adel M.A. Khalifa

Contact person: Dr. Mohsen Eniat, Technical Director

10 professional staff (3 Ph.D.)

Privately funded Annual budget 1986: US$ 50,000

Areas of research:

- Solar energy in general
- Energy conversation
- Computer modelling and simulation of energy systems

Current projects:

- Solar drive-in cafeteria in Cairo
- A portable Shesh Kababer driven by solar heat

Commercialized projects:

-
-
-

Joint research programmes carried out with:

- Under negotiation with Cairo University, Faculty of Engineering:
- A heat pipe solar water heater for Egypt

Suggested areas of co-operation with other research institutes:

- Solar energy applications
- Energy conservation

MEXICO

119. DEPARTMENT DE ENERGIA, CINVESTAV-IPN-MERIDA

Km.6 Ant. Carr. Progreso
A.P. 73 Cordemex.
Merida, Yuc. 97310
Mexico

Telephone: (99) 26-03-99
(99) 26-02-43
Telex: 0753654 CIEMME
Cable:

Director: Dr. Alonso Fernández G.

Contact person: Dr. Roberto Uribe, Chairman of Energy

11 professional staff (6 Ph.D.)

Government funded

Annual budget 1986: US$180,000

Areas of research:

- Uses of solar thermal energy
- Silicon, solar grade
- Photochemical storage
- Hydrogen and thermal storage

Current projects:

- Solar distillation; solar heating in fish-hatching;
- Thermochemical and catalytic processes applied to solar energy
- storage; H2 systems pX-Si production by electrolysis and by
- direct reduction; silanes production; a-Si:H production and characterization;
- photoactivated electron transfer in organized media

Commercialized projects:

-
-
-

Joint research programmes carried out with:

- Universidad Autonoma Metropolitana-Iztapalapa, Avs. Michoacán y Purisima Col. Vicentina, C.P. 09340, Mexico City, Mexico

Suggested areas of co-operation with other research institutes:

- Photochemistry in organized media
- Solar enrgy storage - hydrogen systems
- Synthesis and characterization of semiconductors

NEPAL

120. RESEARCH CENTRE FOR APPLIED SCIENCE AND TECHNOLOGY (RECAST)

Kirtipur Multiple Campus,
Kirtipur
Kathmandu
Nepal

Telephone: 2-14303 Telex: Cable: RECAST

Director: Dr. K.L. Shrestha, Executive Director

Contact person: V.M. Shrestha

4 professional staff

Government funded Annual budget 1986: US$ 2,000

Areas of research:

- Solar cooker, drier and distillation

Current projects:

- Solar cooker

Commercialized projects:

-
-
-

Joint research programmes carried out with:

- There has been collaboration with
- GTZ,Federal Republic of Germany and JOCV,Japan

Suggested areas of co-operation with other research institutes:

- Solar cooker; solar crop drying; timber drying;
- Passive heating/cooling
- Selective coating

NIGERIA

121. SEMICONDUCTOR LABORATORY, UNIVERSITY OF IFE

Department of Electronic and Electrical Engineering
University of Ife
Ile-Ife
Nigeria

Telephone: Ife 2291 Telex: Cable: IFEVARSITY IFE

Director: Prof. V.A. Williams

Contact person: Dr. Titilayo A. Kuku

6 professional staff (4 Ph.D.)

Government funded Annual budget 1986: US$ 40,000

Areas of research:

- Silicon-based integrated devices
- Production of silicon from local quartz deposits
- PV: development of terciary materials like Cu_2SnS_3 and Cu_2O
- Material study for solar spectral selectivity (Cu_2O-Al_2O_3, In_2O_3:Sn, SnO_2:Sb)
- Silicides--formation and surface characterization

Current projects:

- As above

Commercialized projects:

- Negotiating for industrial testing of some of our devices

Joint research programmes carried out with:

- Material Science Laboratory, Imperial College of Science and Technology, London

Suggested areas of co-operation with other research institutes:

- Material study for solar energy conversion
- Development of silicon-based integrated devices

PAKISTAN

122. N.W.F.P. UNIVERSITY OF ENGINEERING AND TECHNOLOGY, PESHAWAR

Department of Mechanical Engineering
P.O.Box 814
Peshawar
Pakistan

Telephone: Telex: Cable:

Director: Dr. Jamal Khan

Contact person: Prof. I.H. Shah

83 professional staff (3 Ph.D.)

Government funded Annual budget 1986: US$ 1.6 million

Areas of research:

- Solar water heating
- Solar cooker
- Solar desalination
- Solar grain dryer

Current projects:

- Solar assisted tobacco barn

Commercialized projects:

-
-
-

Joint research programmes carried out with:

- Colorado State University, USA
- Pakistan Council for Scientific and Industrial Research
- Appropriate Technology Development Organization

Suggested areas of co-operation with other research institutes:

- Selective coating
- Solar ponds
- Silicon cell

PERU

123. INSTITUTE OF INDUSTRIAL TECHNOLOGICAL RESEARCH AND OF TECHNICAL STANDARDS (ITINTEC)

Av. Guardia Civil 400 Esq.Av. Canadá
San Borja
Lima 41
Peru

Telephone: 711617 - 719058 Telex: ITINTEC 20496 PE Cable:

Director: Eng. Jorge Succar

Contact person: Eng. Benjamin Jarufe, Sub-General Director of Technology

7 professional staff (engineers) in Energy Division

Government funded (2% net income of industrial enterprises) Annual budget 1986: US$ 4 million

Areas of research:

- Direct use of solar energy: conversion to thermal energy at low
- temperature (heating and drying);
- Direct conversion to electric energy:pv cells
- Indirect use of solar energy: wind energy: water pump and electricity generation; Bioconversion energy: biogas,
- gasification of wood;
- Micro hydroelectric power plants

Current projects:

- Industrial solar drying, ind. solar systems for water heating;
- Electric energy from windmills; gasification of wood;
- Biogas production from organic wastes

Commercialized projects:

- One solar system for water heating in the textile industry
- Technology transfer to two factories: solar water heaters;
- wind mills for water pumps; solar driers

Joint research programmes carried out with:

- Universidad Nacional Ingeniería, Apart. 1301, Lima, Peru
- COFIDE, Camino Real 390, Lima 27, Peru
- CENERGIA,Av. Las Artes s/n, Lima 41, Peru
- PETROPERU, Av.Paseo de la República 3361, Lima 27, Peru
  Universidad Nacional de Piura, Piura, Peru

Suggested areas of co-operation with other research institutes:

- To receive: bioconversion energy and pv cells;
- To provide: solar heating and drying, water pumping w. windmills

SRI LANKA

124. ARTHUR C. CLARKE CENTRE FOR MODERN TECHNOLOGIES

Katubedda
Moratuwa
Sri Lanka

Telephone: 546546, 507461, 507462 Telex: Cable:

Director: Prof. Cyril Ponnamperuma

Contact person: Dr. W.T. Weerakoon, Deputy Director

12 professional staff

Government and privately funded Annual budget 1986: US$ 48,000

Areas of research:

- Solar energy application in industry and communication

Current projects:

-
-
-

Commercialized projects:

-
-
-

Joint research programmes carried out with:

- The above programme will be carried out in collaboration with Industrial Organizations Centre, Electricity Board and
- Telecommunication Dept. as well as the two technical universities
- in Sri Lanka

Suggested areas of co-operation with other research institutes:

-
-
-

SUDAN

125. NATIONAL ENERGY ADMINISTRATION (NEA)

P.O.Box 2649
Khartoum
Sudan

Telephone: 73315 Telex: 215 Cable: TAGA

Director: Dr. Abdel Rahman Shulli

Contact person: NEA Library

100 professional staff (2Ph.D. plus 4 Ph.D.cand.)

Government funded
USAID, AFME

Annual budget 1986:US$ 750,000 - 1 million

Areas of research:

- Energy planning
- Energy resources
- Conservation
- Renewable energies

Current projects:

- Energy balance for Sudan
- Hot water collection for small scale industries
- Solar fridge for medicine storage in rural area

Commercialized projects:

- Biomass (5)
- Energy conservation (2)
- Planning management (1)

Joint research programmes carried out with:

- Energy Development International (E/DI/USAID)
- French Agency for Energy (AFME)
- German Agency for Energy (GTZ)

Suggested areas of co-operation with other research institutes:

- Economic costs of new technologies
- Dissemination of information on and commercialization of solar energy
- Energy management and planning

SUDAN

126. Energy Research Council

P.O.Box 4032
Khartoum
Sudan

Telephone: 70701 Telex: 24113 SREP Cable: BUHUTH

Director: Dr. El Tayeb Idris Eisa

Contact person: Dr. Ahmed Hassan Hood, Researcher

7 professional staff

Government funded Annual budget 1986: US$ 100,000

Areas of research:

- Solar energy
- Biomass energy
- Wind and mini-hydro

Current projects:

- Diverse

Commercialized projects:

- Cooking stoves
- Wind mills

Joint research programmes carried out with:

- G.I.T. USA
- University of Khartoum, Sudan
- Delft University, Netherlands

Suggested areas of co-operation with other research institutes:

- Biomass
- Solar
- Wind; mini-hydro

TOGO, Rep. of

127. SOLAR ENERGY LABORATORY

University of Benin
B.P.1515
Lomé
Rep. of Togo

Telephone: 21-50-95 Telex:5258 UNIVER-BENIN

Director: Messan Gninin vi

Contact person: Messan Gninin vi, Head of Institute

15 professional staff (2 Ph.D.)

Privately funded Annual budget 1986: US$ 25,000

Areas of research:

- Solar radiation measurements
- Domestic water heating,
- Cooking stoves
- Solar drying, refrigeration
- Solar pond
- Biomass; wind energy

Current projects:

- Initial operation of salt gradient solar pond
- Solar radiation measurements
- Drying crops and other agricultural products
- Flat plate collectors for domestic water heating
- Testing and research on cooking stoves

Commercialized projects:

- Domestic solar water heater

Joint research programmes carried out with:

- Togo-Benin-Ghana: West African solar radiation measurements
- Ghana: University of Ghana, Legon
- Benin: East National University of Benin

Suggested areas of co-operation with other research institutes:

- Wind energy
- Stoves
- Drying agricultural products

TURKEY

128. FIRAT UNIVERSITY

Elazig
Turkey

Telephone: 11904 Telex: Cable:

Director: Prof. Dr. Seref Kunc (Chemistry Dept.)
Dr. Asaf Varol (Mechan.Education Dept.)

Contact person: Prof. Dr. Seref Kunc, Head, Chem. Dept.

5 professional staff (5 Ph.D.)

Government funded Annual budget 1986: US$ 5,000

Areas of research:

- Flat plate collectors
- Concentrating collectors
- Selective surfaces
- Solar data handling

Current projects:

- Flat plate collectors
- Concentrating collectors

Commercialized projects;

-
-
-

Joint research programmes carried out with:

- None

Suggested areas of co-operation with other research institutes:

- Concentrating collectors
- Selective surface

VENEZUELA

129. UNIVERSIDAD NACIONAL EXPERIMENTAL "FRANCISCO DE MIRANDA" (U.N.E.F.M.)

Departamento de Fisica y Matematica, Antiguo Seminario
Calle Zamora
Coro, Estado Falcon
Venezuela

Telephone: (068) 78.072
(068) 51.75.85
Telex:
Cable:

Director: Dr. Hernandez Prado, Abraham, Rector

Contact person: Williams J. Garcia O., Head of Lab. Non-convential

1 professional staff

University funded

Annual budget 1986: US$ 3,000

Areas of research:

- Desalination
- Distillation
- Solar radiation measurements

Current projects:

- Desalination: studies on efficiency of desalin.plant
- Radiation: study of solar radiation in Coro, Edo. Falcón

Commercialized projects:

-
-
-

Joint research programmes carried out with:

-
-
-

Suggested areas of co-operation with other research institutes:

- Desalination
- Solar radiation